Low Impact Hydropower Institute Application for Low Impact Hydropower Certification: Skagit River Hydroelectric Project

Introduction

This report reviews the Application for Certification (AFC) submitted by Seattle City Light (applicant or SCL) for Low Impact Hydropower Certification for the Skagit River Hydroelectric Project (project), located on the Skagit River, in northern Washington State.

The Skagit River Hydroelectric Project was relicensed by the Federal Energy Regulatory Commission (FERC) in 1995 based on a series of comprehensive settlement agreements negotiated by Seattle City Light, state and federal resource agencies, Native American tribes, and an environmental organization (FERC 1995). The agreements are incorporated by reference into the FERC license and provide for various mitigation measures and operating conditions for the new license term.

Resource agency letters of recommendation were not included in the application by Seattle City Light. In order to verify compliance with agency recommendations contained within the settlement agreements, the application reviewer interviewed representatives of resource agencies, an environmental group, and Native American tribes involved in the settlement agreement negotiations and in ongoing projects and monitoring. Relevant documents provided by agencies and the applicant were also reviewed. Records of conversations (ROCs) between agency staff and the application reviewer are provided in Attachment A. No public comments were received by the Low Impact Hydropower Institute during the application comment period.

Facility Description

The Skagit Hydroelectric Project is located on the Skagit River in north-central Washington State, within Snohomish, Skagit, and Whatcom counties (Figure 1). The headwaters of the Skagit River originate in Canada, and the project occupies portions of the Mount Baker-Snoqualmie National Forest (managed by the U.S. Forest Service) and Ross Lake National Recreation Area adjacent to North Cascades National Park (managed by the National Park Service). The project is operated for electricity production in a peaking mode (water is stored and released in accordance with energy needs, subject to restrictions for environmental protection), as well as flood control and downstream flow regulation. The project supplies approximately one-quarter of the City of Seattle's electricity needs (FERC 1995, SCL 2002).

The Skagit Project includes three facilities (from upstream to downstream: Ross, Diablo, and Gorge) each consisting of a dam, powerhouse, and associated reservoir. The facilities are located in close proximity to one another, along approximately 33 miles of the Skagit River (Figure 2).

The largest and upstream-most project facility is Ross Dam (river mile 105). The 540-foot high, concrete arch dam was built in stages between 1937 and 1967 and creates Ross Lake, a 24-mile long reservoir which extends approximately 1.5 miles north of the U.S. - Canada border and covers 11,700 acres. Ross Lake is the primary storage reservoir for the project. The Ross facility has an installed capacity of 360 megawatts (FERC 1995, SCL 2002).

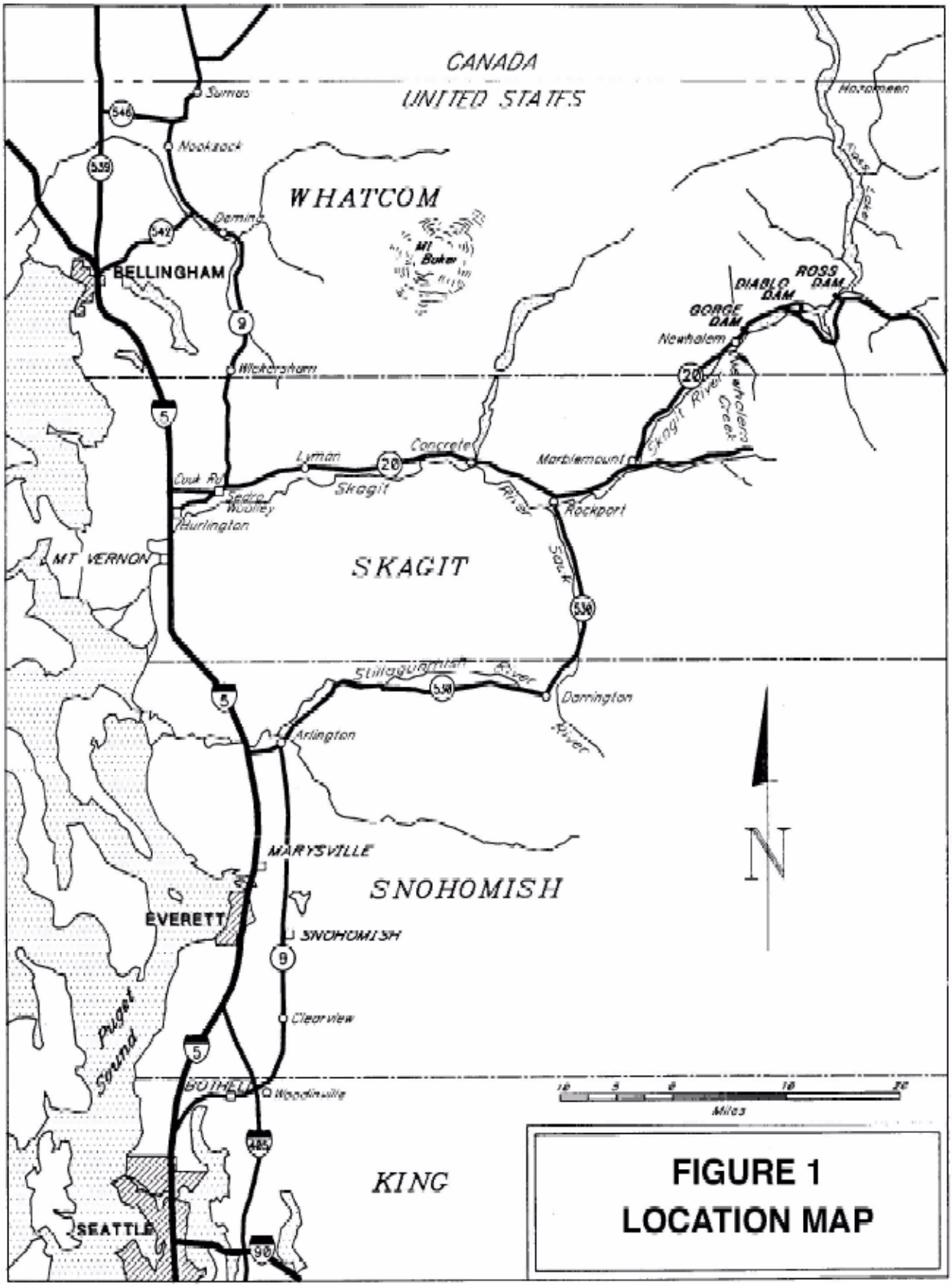

Figure 1. Project location map (Seattle City Light).

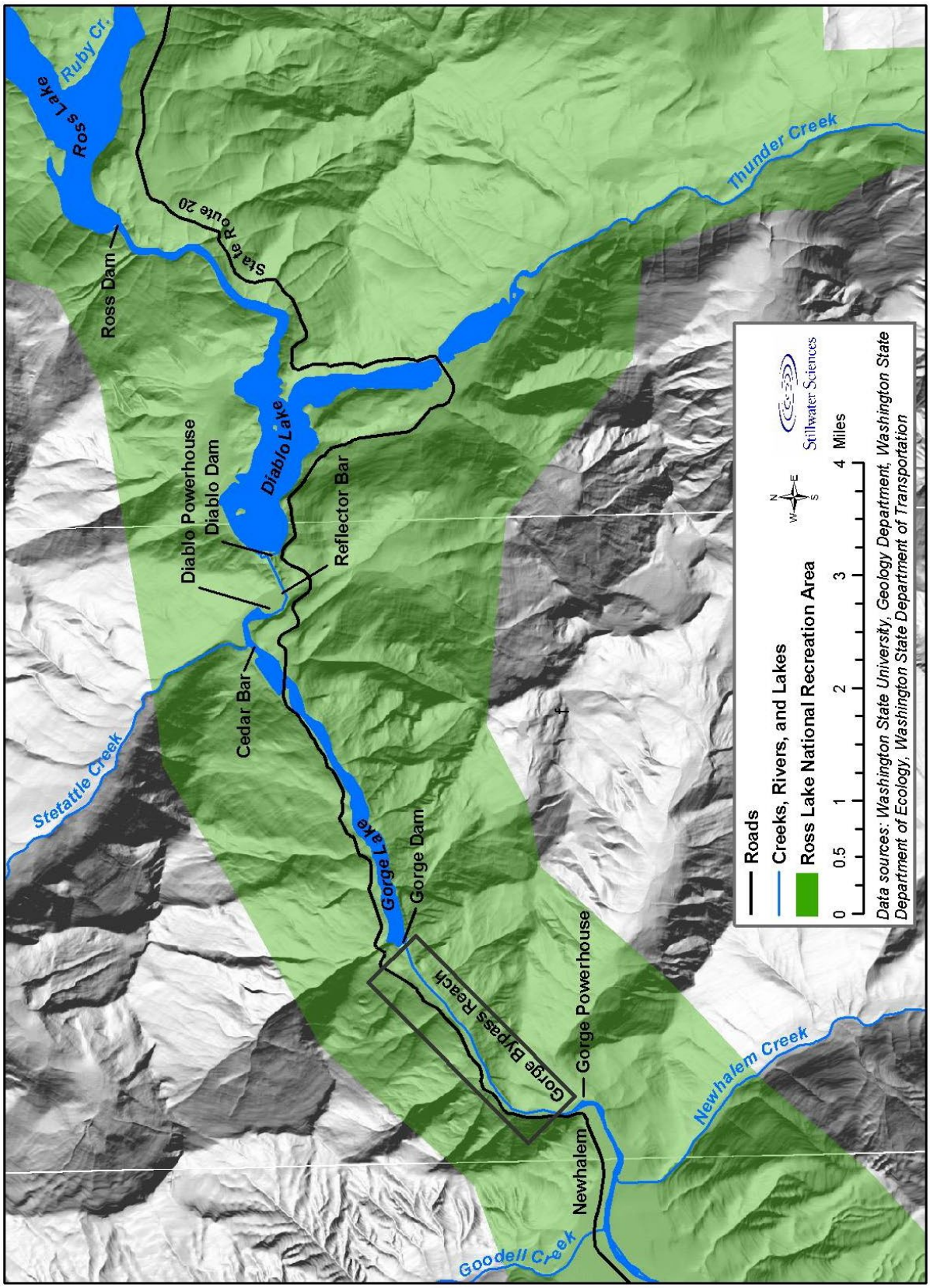

Figure 2. Map of facilities and physical features of the Skagit Project.

The second project facility is located approximately 4 miles downstream of Ross dam. This facility comprises the 389-foot high Diablo dam (river mile 101), an associated powerhouse, and the 910-acre Diablo Lake. The concrete arch dam became operational in 1936 and is used primarily to regulate daily and weekly discharge from Ross Dam. The Diablo facility has an installed capacity of 122.46 megawatts (FERC 1995, SCL 2002).

The third and most downstream facility is Gorge dam and powerhouse. Gorge dam (river mile 97) is a 300-foot high concrete arch and gravity diversion dam built in 1961. The dam creates the 240-acre Gorge Lake. The Gorge facility has an installed capacity of 207.48 megawatts. Water diverted at Gorge dam to the Gorge powerhouse travels through an 11,000-foot long penstock, creating a 2.7 mile long bypassed reach immediately downstream of Gorge Dam along the Skagit River (FERC 1995, SCL 2002).

A short section of river (approximately 1 mile) persists between the Diablo powerhouse and Diablo Dam; the remaining reaches between the dams are inundated by the reservoirs (FERC 1995).

The Low Impact Hydropower Institute (LIHI) defines a facility as the combination of a dam, powerhouse, and reservoir. Under the FERC license however, the three facilities are referred to as a single project (FERC No. 553), and are operated by Seattle City Light as one unit. Therefore most of the operating requirements and agency recommendations are specified for the project as whole rather than for each facility. In our evaluation of the project, we applied the criteria against each of the facilities to comply with the LIHI definition.

Low Impact Certification Criteria

A. Flows:

Criteria

1. **Is the facility in Compliance with Resource Agency Recommendations issued after December 31, 1986 regarding flow conditions for fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking conditions, and seasonal and episodic instream flow variations) for both the reach below the tailrace and all bypassed reaches?**

YES

The applicant has consistently met or exceeded in-stream flow requirements specified in the Fisheries Settlement Agreement (SCL 1991a), with a small number of variances occurring since the agreement took effect (Walsh pers. comm., Sprague pers. comm., Fransen pers. comm.). Recent flow monitoring reports support this conclusion (SCL 2002a). Seattle City Light routinely monitors the adequacy of flows and ramping rates in conjunction with agency and tribal representatives, and has provided additional flow in the past as necessary to protect salmonids during migration, spawning, emergence, and rearing (Walsh pers. comm., Sprague pers. comm.). Resource agency flow recommendations for the project apply only to releases from Gorge powerhouse (see Discussion below) (Sprague pers. comm., Fransen pers. comm.).

Discussion

Agencies, tribes, and environmental groups contacted by the application reviewer support the applicant's assertion that since the implementation of the settlement agreement flows in 1991, salmonid populations in the Skagit River system have maintained or increased their numbers, while salmonid populations in other Washington State rivers have declined (Walsh pers. comm., Sprague pers. comm., Fransen pers. comm.). Reports from agencies, consultants, and Seattle City Light staff also support this conclusion (WDFG et al. 1993, Myers et al. 1998, NMFS 2003, Connor and Pflug *in press*). According to agency and tribal fisheries staff we interviewed, fry strandings were a significant problem prior to the implementation of settlement agreement flows. While some fry strandings still occur under the current flow regime, they have been dramatically reduced; this reduction has significantly increased spawner abundance in the Upper Skagit River (Walsh pers. comm., Sprague pers. comm., Fransen pers. comm.).

Under the FERC license and Fisheries Settlement Agreement, flows were specified only for the mainstem Skagit River downstream of Gorge powerhouse (FERC 1995, SCL 1991a). No flow requirements were specified for the reaches between Diablo and Gorge dams and Diablo and Ross dams, since the majority of these reaches are inundated by project reservoirs. There are provisions in the settlement agreement however, for maintaining water levels in the project reservoirs that are beneficial to resident fish.

As a result of the settlement negotiations, resource agencies did not require flows for the Gorge bypass reach, which remains partially dewatered at times. Agency and tribal representatives indicated that migratory fish habitat in the bypass reach was given up to allow for additional flows in higher quality habitats downstream of the Gorge powerhouse, and to provide more funds for habitat improvement and mitigation projects (Wright pers. comm., Sprague pers. comm., Fransen pers. comm., Walsh pers. comm.). Anadromous fish habitat in the 2.7 mile reach is of low quality, especially at higher flows; by allowing releases from the Gorge powerhouse downstream of the bypass reach, Seattle City Light is able to provide flows for fisheries protection while generating electricity, thus making releases for fisheries purposes economically viable for the utility. To support the negotiated dewatered conditions of the bypass reach, the reach was given a "special condition status" by the Washington State Department of Ecology that allows for higher instream water temperatures than required in downstream waters (see Section B. Water Quality below).

If YES, go to B (Water Quality).

PASS.

B. Water Quality:

Criteria

1. **Is the Facility either:**

a. **In compliance with all conditions issued pursuant to a Clean Water Act Section 401 water quality certification issued for the facility after December 31, 1986? Or**

b. **In Compliance with the quantitative water quality standards established by the state that support designated uses pursuant to the federal Clean Water Act in the Facility area and in the downstream reach?**

YES.

A current water quality certification does not exist for the project. However, the project appears to be in compliance with Washington State Class AA quantitative water quality standards, except for the Gorge bypass reach, which is designated with a "special condition status" for water quality (see below) (WDE 1997). In a letter to Seattle City Light dated December 13, 1991, the Washington State Department of Ecology (WDE) waived its right to water quality certification of the project under Section 401 of the Clean Water (WDE 1991, Wright pers. comm.). The letter also stated that the WDE supported water quality conditions for the project as set forth in the settlement agreements. Although there is no regulatory requirement to monitor water quality for the project, the applicant occasionally monitors water quality conditions in and around the project (Wright pers. comm.). WDE personnel indicated that there are no known water quality issues resulting from the project (Sakrison pers. comm., Wright pers. comm.).

Discussion

Water quality data from the nearest long term monitoring station (Marblemount station, operated by the WDE), located approximately 16 river miles downstream of the project, indicate that water quality in the Skagit River has consistently met standards, with few exceedences. A summary provided with the data states that "overall water quality at this station met or exceeded expectations and is of lowest concern (based on water-year 2001 assessment)" (WDE 2003). High levels of turbidity in the project lakes and downstream reach are due primarily to the influx of glacial till from tributaries (particularly Thunder Creek) and the mainstem Skagit River upstream of the project (Wright pers. comm., Sprague pers. comm.).

The Gorge bypass reach has been designated with a "special condition status" for water quality; this status requires that temperatures not exceed 21°C in the reach due to human activities (Class AA waters must not exceed 16°C as a result of human activities) (WDE 1997). As mentioned above, the establishment of a special water quality condition status for the bypass was negotiated to allow Seattle City Light to supply environmental flow releases from the Gorge powerhouse downstream of the bypass reach, thus making environmental releases economically viable (Wright pers. comm., Sprague pers. comm., Fransen pers. comm.). Monitoring data collected in 1989 indicate that water temperatures may approach 21°C in the downstream portion of the reach during August and September, but generally remain below 19°C throughout the year (Envirosphere 1989). The bypass reach is partially dewatered at times during the year, depending on flow conditions (Sprague pers. comm., FERC 1995).

If yes, go to B2.

2. Is the Facility area or the downstream reach currently identified by the state as not meeting water quality standards (including narrative and numeric criteria and designated uses) pursuant to Section 303(d) of the Clean Water Act?

NO.
None of the project waters (including the mainstem Skagit River and the project lakes) are listed on the most recent 303(d) list published by the Washington State Department of Ecology (WDE 1998). A portion of the South Fork Skagit River below the town of Conway (river mile 4.4) has been 303(d) listed for fecal coliform, but it is unlikely that the listing is due to the project.

PASS.

C. Fish Passage and Protection:

Criteria

1. **Is the facility in compliance with Mandatory Fish Passage Prescriptions for upstream and downstream passage of anadromous and catadromous fish issued by Resource Agencies after December 31, 1986?**

N/A

Fish passage prescriptions were not issued by Resource Agencies for the project as part of the settlement agreements (FERC 1995). Agency personnel we interviewed indicated that the decision to decline issuing fish passage prescriptions was driven by a combination of biological and policy considerations (see Discussion below).

If N/A, go to C2.

2. **Are there historic records of anadromous and/or catadromous fish movement through the Facility area, but anadromous and/or catadromous fish do not presently move through the Facility area (e.g., because passage is blocked at a downstream dam or the fish run is extinct)?**

YES

The available historical data provides conflicting information about the passage of migratory fish under pre-project conditions above Gorge Dam (Table 1). However, given a plain reading of this criterion the answer to this question must be "YES" for the Gorge facility, since historical information exists that indicates at least some steelhead occasionally passed upstream of Gorge Dam, to areas near Cedar Bar, Stetattle Creek, and Reflector Bar (Figure 2) and steelhead no longer move through the Gorge facility area (see Discussion below).

If yes, go to C2a

a. **If the fish are extinct or extirpated from the Facility area or downstream reach, has the Applicant demonstrated that the extinction or extirpation was not due in whole or part to the Facility?**

NO (FAIL)

The construction of the Gorge facility permanently blocked access by migratory fish to the river reach between Gorge and Diablo dams (FERC 1995, Envirosphere 1988). According to the information available, the Gorge facility fails the criteria in question C2a, because the applicant has not demonstrated that the Facility is not responsible in whole or part for the extirpation of migratory fish from the area between Gorge and Diablo dams as a result of project construction.

Discussion

In their application, Seattle City Light answered "NO" to question C2. SCL believes there are no "reliable" historical records that fish passage occurred, based on the findings of a 1921 fisheries survey (Smith and Anderson 1921), a 1989 fish passage barrier analysis (Envirosphere 1989), and interviews with longtime local resident Glee Davis (Envirosphere 1988) (SCL 2003). Seattle City Light's application states "…historic records indicate that a few steelhead trout may have occasionally migrated upstream through

the narrow gorge under certain flow conditions to Stettatle Creek, which is located about 2 miles above Gorge Dam."

Given a plain reading of the C2 criterion, we believe the answer to C2 to be "YES", since at least some historical accounts of steelhead passage above Gorge Dam exist. In addition, based on the available physical habitat information, we cannot rule out the possibility that steelhead occasionally passed upstream to areas between Gorge and Diablo dams. A "YES" answer to C2 leads to C2a, which is clearly "NO" since the Gorge facility certainly caused the extirpation of any anadromous fish in the Gorge-Diablo dam reach (see below for more information).

In SCL's original application, a "NO" answer for C2 leads to C3, which essentially probes the reasons behind an agency declining to prescribe fish passage:

3. If, since December 31, 1986:
a. Resource Agencies have had the opportunity to issue, and considered issuing, a Mandatory Fish Passage Prescription for upstream and/or downstream passage of anadromous or catadromous fish (including delayed installation as described in C2a above), and
b. The Resource Agencies declined to issue a Mandatory Fish Passage Prescription,
c. Was a reason for the Resource Agencies' declining to issue a Mandatory Fish Passage Prescription one of the following: (1) the technological infeasibility of passage, (2) the absence of habitat upstream of the Facility due at least in part to inundation by the Facility impoundment, or (3) the anadromous or catadromous fish are no longer present in the Facility area and/or downstream reach due in whole or part to the presence of the Facility?

During the settlement agreement negotiations, resource agencies had the opportunity to consider issuing fish passage prescriptions for the project, but declined to do so due to a combination of biological and negotiated policy considerations (see "Resource Agency Views" below). According to a National Marine Fisheries Service (NMFS) biologist who was working for the Skagit System Cooperative (a tribal group) during the settlement negotiations, inundation of two of the three available historical spawning sites between Gorge and Diablo dams contributed to the decision to not require fish passage at Gorge Dam (Fransen pers. comm.). In light of this information, a plain reading of the certification criteria would trigger a "YES" answer to question C3, causing the Gorge facility to fail this criterion as well. In supplementary information provided by SCL, the utility disagrees, stating that SCL's fish biologist, Dave Pflug, who was involved in the settlement agreement negotiations on behalf of SCL, believes inundation was not an issue in the negotiations for mitigating impacts to anadromous fish (SCL 2003). The application reviewer is currently seeking clarification on this issue from the agencies involved in the settlement negotiations.

Historical accounts

The primary source of known historical, pre-project and post-project accounts provided by SCL is a report by a Seattle City Light consultant on the original impacts of the Skagit Project on wildlife and fish habitats and populations (Envirosphere 1988). The report summarizes physical and biological information gleaned from a number of personal accounts, a 1921 fisheries survey, agency reports, and historical correspondence between SCL and state resource agencies. An annotated summary of relevant historical information is provided in Table 1. A 1989 barrier analysis report for the Gorge bypass reach and the complete text of the 1921 fisheries survey (Smith and Anderson 1921: reviewed in the Envirosphere report) were also provided to the application reviewer by SCL.

The consultant report (Envirosphere 1988) concludes a "…small number of steelhead trout probably returned to the Reflector (and presumably Cedar) Bar area(s) and lower Stetattle Creek." Regarding salmon passage, the report concludes: "Possibly, a very small number of spring chinook salmon returned to the Cedar/Reflector Bar areas." The conclusions regarding steelhead passage appear to be supported by at least two individuals who were interviewed by Washington State Department of Fisheries (WDF) staff in 1936, correspondence between WDF and Seattle City Light in the 1930's and 1940's, and a 1946 legal agreement between SCL and WDF. However, these accounts are contradicted by other interviews, letters from SCL disputing historical steelhead passage claims by WDF, and the Smith and Anderson (1921) fisheries survey, all of which conclude that migratory salmon and steelhead did not pass upstream of Gorge Dam (see Table 1 for additional information regarding these information sources).

Complicating the inconclusive nature of the historical accounts is the issue of steelhead and rainbow trout identification. Steelhead is the term used to distinguish anadromous populations of rainbow trout (*Oncorhynchus mykiss*) from resident populations. At times during their lifecycles, the two forms can be difficult to distinguish by untrained observers in freshwater environments, leading to problems with rainbow trout being identified as steelhead or vice-versa. Historical information indicates that rainbow trout were widespread and present in large numbers in the Upper Skagit River area.

Table 1. Summary of relevant historical accounts as documented in Envirosphere (1988).

Information type	Notes	Was there pre-project steelhead and/or salmon passage above Gorge Dam?
Interview	A 1970 National Park Service interview with Glee Davis, who worked for the USFS and SCL, and lived near Stetattle Creek from 1890-1929.	No. Davis states that neither passed upstream of the Gorge powerhouse area.
Fisheries survey of the Skagit River (Smith and Anderson 1921). (Also provided in its entirety by SCL)	Smith and Anderson characterize their study as "superficial." It is not clear from survey text if sampling in the mainstem reach between Diablo and Gorge dams or Stetattle Creek took place. Authors may have relied on accounts from local residents, possibly Glee Davis. Contains results from a single summer/fall survey period.	No. "Those living in this region who have given close attention to the movement of fish have never seen salmon more than one mile above [Newhalem]."
Interviews from an "unofficial" Washington State Department of Fisheries report.	Interview with Frank Pressentin, of Marblemount, approximately 14 mi downstream of project.	**Yes** – steelhead only.
	Interview with Ed O'Brien.	No. States he never knew of salmon passing upstream of Newhalem. Does not mention steelhead specifically.
	Interview with Otto Pressentin of Birdsview.	No. States there never were any salmon above Newhalem Gorge (in the bypass reach area). Does not mention steelhead specifically.

	Interview with Tommy Thompson, a local USFS ranger since 1910's.	**Yes** – steelhead only. States there were no salmon above Goodell Creek; steelhead used to spawn in Stetattle Creek but didn't pass further upstream than Reflector Bar.
Inspection report for two miles of the Skagit between Gorge powerhouse and dam conducted by "state" employees.	Interview with a "train-main" by two State employees in 1946.	No. States that he had seen salmon and steelhead attempt a barrier in the Gorge bypass reach (possibly barrier #1 in SCL 1989), but thought only a few steelhead had ever passed it. States that he had never seen a salmon or steelhead as far as the "gorge intake dam" – presumed to be at the site of Gorge Dam.
	A legal agreement drafted in 1946 between Seattle City Light and the state agencies that were precursors to the Washington State Department of Fish and Game. The agreement seems to have been the culmination of a number of letters and meetings between SCL and the state agencies.	**Yes** – steelhead, salmon, and cutthroat. Claims the three project dams caused "…the destruction of the salmon, steelhead and cutthroat trout runs to a small extent in the area above the Gorge Dam…" The agreement continues to state that very few spring chinook salmon spawned above the site of Gorge Dam, but that some steelhead spawned above Gorge Dam. The settlement described by the legal agreement requires Seattle City Light to pay $55,000 towards building a fish hatchery. **SCL officials may have agreed with the language in the legal agreement, despite contesting the agencies position in previous letters, in order to settle a series of disagreements with state agencies over mitigation for downstream impacts to fish (Envirosphere 1988).**

Physical habitat information

The confused nature of the historical accounts leads to a secondary question: would steelhead or chinook have been able to pass upstream to areas between Gorge and Diablo dams, based on an evaluation of the physical habitat? Historical, pre-project physical habitat descriptions characterize the Skagit River between Ruby Creek (just upstream of Ross Dam) and Newhalem (approximately 2 miles downstream of Gorge Dam) as an area of narrow, steep canyons with numerous boulder cascades and rapids. A significant natural barrier in the area of Diablo Dam would probably have prevented further passage upstream under most, if not all, flow conditions (Envirosphere 1988, Sprague pers. comm., Fransen pers. comm.).

A 1989 analysis of migratory fish barriers in the Gorge bypass reach identified two barriers that may have limited anadromous fish passage historically. The downstream-most barrier, approximately 0.6 miles upstream of the Gorge powerhouse, was characterized as a "certain barrier" to migratory fish passage in the report. This barrier consists of a 9-ft vertical drop with a shallow (less than 2 ft depth) plunge pool that would make salmon or steelhead passage difficult under baseflow conditions. According to the

report, the second barrier, approximately 1.3 miles upstream of the Gorge powerhouse, would not prevent passage of steelhead and chinook salmon.

The report qualifies the findings by remarking that at discharges between baseflow and 1,000 cfs, a 4 or 5-foot deep backwater plunge pool may develop at the first barrier, potentially allowing fish to pass. The report continues to conclude that at 1,000 cfs, calculated water velocities in the area of this barrier would "not prevent passage upstream." In discussions with the application reviewer, the author of this report, Mr. Edward Connor (who now works for SCL) noted that the first barrier is mostly whitewater and chute-like. Water conditions near the barrier would almost certainly exclude salmon species and would provide difficult passage for steelhead given the high water velocities occurring in the narrow chutes (E. Connor, pers. comm.). However, Mr. Connor stated that upstream passage might have occurred under a narrow range of flows between baseflow and 1,000 cfs, with passage becoming more difficult at higher flows due to the development of velocity barriers. According to pre-project flow data provided by SCL, natural flows of less than 1,000 cfs would have occurred less than 5% of the time during the steelhead spawning period.

It is important to note that steelhead are considered to be among the strongest swimmers of freshwater fishes. Cruising speeds, which are used for long-distance travel, are up to 5 ft/s; sustained speeds, which may last several minutes and are used to surpass rapids or other barriers, range from 5 to 15 ft/s, and darting speeds, which are brief bursts used in feeding and escape, range from 14 to 27 ft/s (Bell 1973, as cited in Everest et al. 1985; Roelofs 1987). Although the exact velocities of waters in the chutes near the first barrier are unknown, velocities appear to be high, possibly 15 ft/s or higher at 1,000 cfs (E. Connor, pers. comm.). Velocities in this range would not necessarily preclude steelhead passage, but would certainly reduce the frequency and number of fish passing.

Steelhead have been observed making leaps of up to 17 ft over falls under ideal conditions (e.g. large, deep pools with significant up-currents) (W. Trush pers. comm.). Conditions at the first barrier are certainly not ideal; the shallow pool depths and white water conditions at the site would reduce the ability of steelhead to perform significant leaps. In addition, according to Mr. Connor, the hydraulics of the pool below the barrier may present a significant horizontal barrier to steelhead passage. Further detailed studies would be necessary to provide a more accurate characterization of these passage issues in the barrier area.

Resource agency views

Resource agency personnel we interviewed indicated that they believe some level of anadromous fish passage occurred historically upstream of Gorge Dam, based on the available information (Fransen pers. comm., Sprague pers. comm.). However, during the settlement agreement negotiations the agencies and other parties involved agreed that, since there is little current spawning habitat for anadromous fish and the cost to pass fish above the Gorge Dam was high, the negotiations would instead focus on providing resources for improving habitat conditions in river reaches upstream and downstream of the project (Fransen pers. comm., Walsh pers. comm., Sprague pers. comm.). Information available at the time indicated that increasing minimum flows and reducing the amplitude and frequency of ramping flows downstream of the Gorge powerhouse would provide substantial benefits for anadromous fish (Fransen pers. comm., Walsh pers. comm.).

In addition to not requiring passage, the Resource Agencies did not request a reservation of fishway prescription authority, although a standard provision in FERC licensing (Article 15) reserves FERC's

authority to require fish passage in the future, should circumstances warrant (FERC 1995). The U.S. Fish and Wildlife Service (USFWS) is currently evaluating the need for passage in the Skagit Project for bull trout as part of the agency's recovery planning process, however passage may not necessarily be required (Chan pers. comm.). Bull trout were listed under the federal Endangered Species Act in 1999, after the FERC licensing process was completed. The agency is not currently considering passage options that would link the upper and lower Skagit River reaches, but is studying the possibility of providing passage linking the Gorge and Diablo reservoirs to the Ross Lake system. A Seattle City Light biologist is a member of the recovery planning team for bull trout and will be involved in implementing any mitigation measures resulting from the recovery plan.

A rationale for a plain reading of the C2 criterion

As noted above, the available historical record is inconclusive regarding the actual extent of pre-project fish passage (Table 1). Unfortunately, LIHI does not provide a definition of what constitutes valid "historic records", making interpretation of the C2 criterion difficult given the nature of the information. The line-by-line instructions for interpreting the criteria (LIHI 2003 – Certification Criteria, Part VI) state that the fish passage and protection criterion is designed "…to ensure that, where necessary, the Facility provides effective fish passage for Riverine, anadromous and catadromous fish…" Again, LIHI does not provide guidance for deciding what "necessary" passage might be. If the C2 criterion stated: "…are there historical records of *significant* anadromous and/or catadromous fish movement through the Facility area…" the application reviewer could provide a reasoned, scientifically-based response.

LIHI states that the application reviewer's role is to "…conduct any factual investigation needed to resolve factual disputes and evaluate the veracity of claims…" In addition, LIHI states that the criteria are designed to be *objective* in nature, with the goal of creating a "…credible and accepted standard for consumers to use in evaluating hydropower…" (LIHI 2003 – Certification Package Part III). Most of the criteria defer to resource agency recommendations in deciding low impact status, but the Section C criterion appears designed look beyond agency recommendations to uncover facts that would establish if a facility has impacted migratory fish. This departure, together with language included in the Certification Package, leads us to conclude that LIHI did not intend for the application reviewer to independently provide alternative interpretations of the Low Impact Criteria. In the absence of further guidance from LIHI, we are unable to provide a valid rationale for changing the plain meaning of the C2 criterion language as it relates to historical records of fish passage.

Conclusion – fish passage

According to our interpretation of the Certification Package and the available information, it does not appear that the Gorge facility can pass the C2 criterion. The failure of the Gorge facility to meet the fish passage criteria results from two issues: (1) historical records and physical habitat information which indicate a low level of anadromous fish passage into the area of Gorge reservoir and (2) a cost-benefit decision regarding fish passage which came about during the settlement negotiations. The resource agencies were given the chance to require fish passage, and declined for what we believe to be sound reasons, however the C2 and C3 criteria do not appear to support the results of negotiated settlements.

The area between the Gorge and Diablo dams appears to have been the upper range of anadromous fish distribution in the Skagit River and probably provided a relatively small amount of spawning habitat under historical conditions. In our final analysis, based on the historical record and physical habitat information, we are unable to rule out the possibility that at least some steelhead occasionally passed

upstream of Gorge Dam under pre-project conditions. A scenario of occasional steelhead passage might help to explain the apparent confusion in the historical record, since the number of fish passing would be highly variable depending on historical channel and flow conditions in the bypass reach.

FAIL (GORGE FACILITY).

D. Watershed Protection:

Criteria:

1. **Is the Facility in Compliance with Resource Agency Recommendations, or, if none, with license conditions, regarding protection, mitigation or enhancement of lands inundated by the Facility or otherwise occupied by the Facility, or regarding other watershed protection, mitigation and enhancement activities?**

YES
According to documents provided by Seattle City Light and discussions with agency staff, the project appears to be in compliance with the Wildlife Settlement Agreement (SCL 1991b) and the Erosion Control Settlement Agreement (SCL 1991c) – the two agreements pertaining to watershed protection issues (FERC 2000). In addition, according to an environmental group involved in the settlement negotiations, the applicant consistently goes beyond the requirements to implement watershed protection measures (Krause pers. comm.). The primary vehicle for watershed protection efforts is the land acquisition provisions contained within the Wildlife Settlement Agreement. These provisions require Seattle City Light to strategically purchase lands with important wildlife, fisheries, or other natural resource values (SCL 1991b).

PASS.

E. Threatened and Endangered Species Protection:

Criteria:

1. **Are threatened or endangered species listed under state or federal Endangered Species Acts present in the Facility area and/or downstream reach?**

YES.
Five terrestrial species listed under the federal Endangered Species Act (ESA) occur in the project area (all have threatened status): bald eagle, grizzly bear, northern spotted owl, marbled murrelet, and the grey wolf (FERC 1995, USFWS 2003). The peregrine falcon also occurs in the project area, but was delisted in 1999. Aquatic species listed in the project area under the federal ESA include chinook salmon (threatened – Puget Sound Evolutionarily Significant Unit) and bull trout (threatened – Puget Sound Recovery Unit) (USFWS 2003, NMFS 2003). Chinook salmon are present downstream of the project and bull trout are located in each of the project reservoirs and upstream and downstream of the project facilities (FERC 1995). Both fish species were listed under the federal ESA in 1999, after the FERC license for the project was issued.

If yes, go to E2.

2. If a recovery plan has been adopted for the threatened or endangered species pursuant to Section 4(f) of the Endangered Species Act or similar state provision, is the Facility in Compliance with all recommendations in the plan relevant to the Facility?

N/A.
None of the existing recovery plans for species within the project area contain recommendations specific to the project (USFWS 2003, NMFS 2003). During the FERC licensing proceedings, FERC and USFWS agreed that the project was "not likely to adversely effect" listed species (FERC 1995, USFWS 1994). Recovery plans are currently being developed for chinook salmon and bull trout (Fransen pers. comm., Sprague pers. comm., Chan pers. comm.). Seattle City Light staff are involved in the recovery planning process for these species.

If N/A, go to E3.

3. If the Facility has received authority to Incidentally Take a listed species through: (i) Having a relevant agency complete consultation pursuant to ESA Section 7 resulting in a biological opinion, a habitat recovery plan, and/or (if needed) an incidental take statement; (ii) Obtaining an incidental take permit pursuant to ESA Section 10; or (iii) For species listed by a state and not by the federal government, obtaining authority pursuant to similar state procedures; is the Facility in Compliance with conditions pursuant to that authority?

N/A.
The project has not received authority to incidentally take listed species. NMFS does not currently consider the Skagit Project a high priority for Section 7 consultation for chinook salmon due to the adequacy of mitigation measures implemented under the settlement agreements (Fransen pers comm.). The USFWS is currently in the recovery planning process for bull trout, and may consider Section 7 consultations if needed for the project (Chan pers. comm.).

If N/A, go to E5.

5. If E2 and E3 are not applicable, has the Applicant demonstrated that the Facility and Facility operations do not negatively affect listed species?

YES.
In 1994, both FERC and USFWS agreed that the project was "not likely to adversely effect" listed terrestrial species (FERC 1995, USFWS 1994). Since the implementation of the Settlement Agreement flows in 1991, chinook salmon populations in the Skagit River system have maintained or increased their numbers, while chinook populations in other Washington State rivers have declined (Walsh pers. comm., Sprague pers. comm., Fransen pers. comm.). Reports from agencies, consultants, and Seattle City Light staff also support this conclusion (WDFG et al. 1993, Myers et al. 1998, NMFS 2002, Connor and Pflug *in press*). Monitoring data collected by Seattle City Light biologists show that healthy populations of bull trout exist both upstream and downstream of the project (Chan pers. comm.). Ongoing studies supporting the recovery planning process may indicate a need for additional spawning habitat for bull trout populations in the Gorge and Diablo reservoirs. As mentioned above, the USFWS is considering passage options that would improve bull trout population mixing among the project reservoirs.

PASS.

F. Cultural Resource Protection:

Criteria:

1. **If FERC-regulated, is the Facility in compliance with all requirements regarding Cultural Resource protection, mitigation or enhancement included in the FERC license or exemption?**

YES
The applicant appears to have met all cultural resource protection requirements of the FERC license. Seattle City Light, four Native American tribes, and the National Park Service developed five separate agreements concerning cultural, archaeological, and historic resources during the relicensing process. Representatives from the tribes and the National Park Service have indicated their overall satisfaction with the applicant's implementation of the agreements (Luxenberg pers. comm., Mierendorf pers. comm., Joseph pers. comm., Campbell pers. comm.).

PASS.

G. Recreation:

Criteria:

1. **If FERC-regulated, is the Facility in Compliance with the recreational access, accommodation (including recreational flow releases) and facilities conditions in its FERC license or exemption?**

YES.
According to the latest FERC compliance report (FERC 2000), the project is in compliance with recreation conditions in the FERC license and settlement agreements. National Park Service staff has confirmed that Seattle City Light is proceeding with many of the projects required as a result of the settlement agreement (Paleck pers. comm.).

If yes go to G3.

3. **Does the Facility allow access to the reservoir and downstream reaches without fees or charges?**

YES.
The project facilities are located entirely within the Ross Lake National Recreation Area, which is managed by the National Park Service. Access to the reservoirs is free to the public, except for certain boat launch facilities operated by National Park Service concessionaires (Paleck pers. comm.).

PASS.

H. Facilities Recommended for Removal:

Criteria:

1. **Is there a Resource Agency recommendation for removal of the dam associated with the Facility?**

NO.
There have been no recommendations for removal of any of the three dams that comprise the Skagit River Hydroelectric Project.

PASS.

THE GORGE FACILITY FAILS THE LOW IMPACT CRITERIA
THE DIABLO AND ROSS FACILITIES ARE LOW IMPACT

Discussion and conclusion

Despite the results of our analysis under the LIHI criteria we believe the Skagit Project, as currently managed under the terms of the settlement agreements, is operating with minimal impacts to fisheries and the environment. Flow releases downstream of the project have resulted in marked increases salmonid populations in the Skagit River while salmonid populations in other Washington State rivers have been declining. Recent studies indicate that resident fish populations, including bull and rainbow trout, are healthy. SCL continues to implement measures to enhance migratory and resident fish habitats in both the upper and lower Skagit River areas. The utility has implemented a number of measures, including land acquisition and management, to mitigate for terrestrial impacts of the project.

Through its implementation of the settlement agreements, ongoing monitoring, and its "fish first" policy, we believe Seattle City Light has shown a strong commitment to environmental stewardship. All of the resource agency, tribal, and environmental group representatives we contacted held a favorable opinion of SCL and its actions regarding environmental issues. Several interviewees characterized SCL as one of the most environmentally conscientious utilities in the Pacific Northwest.

The wording of the C2 criterion presented a dilemma for the application reviewer: do we *liberally* interpret the C2 criterion to pass a project we believe is, on the whole, operating with minimal impacts to the environment, or do we *objectively* apply the criterion, upholding what may or may not be the original intent of the criterion, but thereby failing the project? In the end, we deferred to the language of the LIHI criteria in evaluating the available information, reasoning that LIHI intended for the criteria to be objectively applied to each hydroelectric project applying to the program.

Literature Cited

Campbell, Larry. Swinomish Indian Tribal Community. 2003. Personal communication with W. Sears, Stillwater Sciences. March 31, 2003. See Attachment A for record of contact.

Chan, Jeff. U.S. Fish and Wildlife Service. 2003. Personal communication with W. Sears, Stillwater Sciences. April 15, 2003. See Attachment A for record of contact.

Connor, Edward. Seattle City Light. 2003. Personal communication with W. Sears, Stillwater Sciences. April 23, 2003 and May 8, 2003. See Attachment A for record of contact.

Connor, E. and D. Pflug. *In Press*. Changes in the distribution and density of salmon spawning in the upper Skagit River in response to flow management measures. North American Journal of Fisheries Management.

Envirosphere. 1988. Study of Skagit Dams Original Impacts on Wildlife and Fish Habitat and Populations. Report for Seattle City Light by Envirosphere Company, Bellevue, Washington. Excerpts available online: www.lowimpacthydro.org/Skagit/Salmon_history.pdf.

Envirosphere. 1989. Volume II: Sections 3-9, Intervenor Comments and SCL Responses. Submitted by Seattle City Light to FERC in Response to a Request for Supplemental Environmental Information. John Brueggeman, Project Manager.

Everest, F. H., N. B. Armantrout, S. M. Keller, W. D. Parante, J. R. Sedell, T. E. Nickelson, J. M. Johnston, and G. N. Haugen. 1985. Salmonids. Pages 199-230 in E. R. Brown, editor. Management of wildlife and fish habitats in forests of western Oregon and Washington. Part 1—Chapter narratives. U. S. Forest Service, Portland, Oregon.

Federal Energy Regulatory Commission (FERC). 1991. Skagit River Hydroelectric Project FERC No. 553 – Offer of Settlement.
Available online: www.lowimpacthydro.org/Skagit/settlement_main.pdf.

Federal Energy Regulatory Commission (FERC). 1995. Order Accepting Settlement Agreement, Issuing New License, and Terminating Proceeding – Skagit River Hydroelectric Project. Available online: www.lowimpacthydro.org/Skagit/Skagit_license.pdf.

Federal Energy Regulatory Commission (FERC). 2000. Environmental and public use inspection report for the period of July 23, 1997 to July 28, 2000. Available online:
www.lowimpacthydro.org/Skagit/Inspection_report.pdf

Fransen, Steve. National Marine Fisheries Service. 2003. Personal communication with W. Sears, Stillwater Sciences. April 7, 2003. See Attachment A for record of contact.

Joseph, James. Sauk-Suiattle Tribe. 2003. Personal communication with W. Sears, Stillwater Sciences. March 31, 2003. See Attachment A for record of contact.

Krause, Fayette. North Cascades Conservation Council (& The Nature Conservancy). 2003. Personal communication with W. Sears, Stillwater Sciences. April 2, 2003. See Attachment A for record of contact.

Low Impact Hydropower Institute (LIHI). 2003. Website: www.lowimpacthydro.org. Accessed March 28, 2003.

Luxenberg, Gretchen. National Park Service. 2003. Personal communication with W. Sears, Stillwater Sciences. April 4, 2003. See Attachment A for record of contact.

Mierendorf, Robert. National Park Service. 2003. Personal communication with W. Sears, Stillwater Sciences. April 2, 2003. See Attachment A for record of contact.

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. National Marine Fisheries Service, NOAA Technical Memorandum NMFS-NWFSC-35. Seattle, Washington.

National Marine Fisheries Service (NMFS). 2003. Website: www.nmfs.noaa.gov. Accessed March 2003.

Paleck, Bill. National Park Service. 2003. Personal communication with W. Sears, Stillwater Sciences. April 3, 2003. See Attachment A for record of contact.

Roelofs, T. D. 1987. A steelhead runs through it. Trout 28: 12-21.

Sakrison, Rod. Washington State Department of Ecology. 2003. Voice mail message left with W. Sears, Stillwater Sciences. April 14, 2003.

Seattle City Light (SCL). 1991a. Fisheries Offer of Settlement Incorporating Anadromous Fish Flow Plan (Flow Plan) and Anadromous and Resident Fish Nonflow Plan (Nonflow Plan). Skagit River Hydroelectric Project FERC No. 553. Seattle. Available online: www.lowimpacthydro.org/Skagit/Fisheries_settle.pdf.

Seattle City Light (SCL). 1991b. Skagit River Hydroelectric Project No. 553: Settlement Agreement Concerning Wildlife. City Light Department, Seattle, with Washington Department of Wildlife, National Park Service, Bureau of Indian Affairs, U.S. Fish and Wildlife Service, U.S. Forest Service, Upper Skagit Tribe, Sauk-Suiattle Tribe, Swinomish Indian Tribal Community, and the North Cascades Conservation Council.

Seattle City Light (SCL). 1991c. Skagit Hydroelectric Project FERC No. 553: Settlement Agreement Concerning Erosion Control Between the City of Seattle and the U.S. Department of Interior, National Park Service. City Light Department, Seattle. April.

Seattle City Light (SCL). 2002. Application for Low Impact Hydropower Certification for the Skagit River Hydroelectric Project. www.lowimpacthydro.org/Skagit/Skagit_App.pdf.

Seattle City Light (SCL). 2002a. Skagit River Project Semi-annual Flow Compliance Report, reporting period February 1, 2002 – July 31, 2002. Prepared October 2002 by Seattle City Light.

Seattle City Light (SCL). 2003. Additional Information and Clarification of Seattle City Light's Application for Low Impact Hydro Certification for the Skagit Hydroelectric Project. April 23, 2003. Available online: www.lowimpacthydro.org/Skagit/Passage_info.pdf.

Smith, V.E., and M.C. Anderson. 1921. A preliminary biological survey of the Skagit and Stillaguamish Rivers. University of Washington School of Fisheries, for Washington Department of Fisheries and Game. 76 pages.

Sprague, Gary. Washington State Department of Fish and Wildlife. 2003. Personal communication with W. Sears, Stillwater Sciences. March 20, 2003. See Attachment A for record of contact.

Trush, William. Professor – California State University, Humboldt. 2003. Personal communication with W. Sears, Stillwater Sciences. May 11, 2003. See Attachment A for record of contact.

United States Fish and Wildlife Service (USFWS). 1994. Letter to Mr. John Clements, Acting Director Division of Project Review, Federal Energy Regulatory Commission regarding the Skagit River Hydroelectric Project, FERC Project No. 553, Biological Assessment concurrence. Dated August 10, 1994.

United States Fish and Wildlife Service (USFWS). 2003. Website: www.fws.gov. Accessed in March 2003.

Walsh, Stan. Skagit System Cooperative. 2003. Personal communication with W. Sears, Stillwater Sciences. March 19, 2003. See Attachment A for record of contact.

Washington State Department of Ecology (WDE). 1991. Letter to Ms. Kirvil Skinnarland of Seattle City Light regarding the Skagit River Hydroelectric Project, FERC Project No. 553, Request for Water Quality Certification. Dated December 13, 1991.

Washington State Department of Ecology (WDE). 1997. Washington Administrative Code 173-201A-130. www.epa.gov/ost/standards/wqslibrary/wa/wa_10_chapter173-201a.pdf.

Washington State Department of Ecology (WDE). 1998. 303(d) List of Impaired and Threatened Waterbodies. www.ecy.wa.gov/programs/wq/303d/.

Washington State Department of Ecology (WDE). 2003. Water Quality Monitoring Data: 04A100 - Skagit R @ Marblemount. www.ecy.wa.gov/apps/watersheds/riv/.

Washington State Department of Fish and Wildlife (WDFW), Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State salmon and steelhead stock inventory. Appendix 2, Puget Sound stocks, north Puget Sound volume. Olympia, Washington.

Wright, Robert. Washington State Department of Ecology. 2003. Personal communication with W. Sears, Stillwater Sciences. March 20, 2003. See Attachment A for record of contact.

Attachment A

Report of Contacts (ROCs)

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	March 19, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Stan Walsh/Skagit System Cooperative (Skagit Tribes)
Telephone Number:	(360) 466-1512
Areas of Expertise:	Flows, Fish Passage and Protection, TES Species

Substance of Discussion:

The application reviewer asked the following questions regarding Flows:

1) Has Seattle City Light met the conditions of the flow and non-flow settlement agreements in your opinion?
2) Do you feel the "full and complete" and "best efforts clause" is being implemented by the applicant to the extent feasible?
3) How significant were fry strandings before the flow agreements in the early 1980's?
4) Flow requirements were specified only for Gorge Dam below the powerhouse in the Settlement Agreements; are there any flow/fisheries related issues regarding Gorge and Diablo reservoirs or the bypass reach?

Mr. Walsh believes the applicant meets and occasionally exceeds the requirements of the flow and non-flow agreements. Mr. Walsh stated that Seattle City Light "routinely goes beyond the settlement agreement requirements to protect fisheries", and takes seriously its stated policy of "fish first". Mr. Walsh frequently accompanies Seattle City Light biologists and agency personnel on routine field visits along the river below the project to assess the adequacy of flows and ramping rates with regards to fisheries protection. Athough Mr. Walsh was not involved in the project during the early 1980's, he understands from discussions with others who were involved that fry strandings were common and significant before the flow agreements. With regards to flow/fisheries issues regarding Gorge and Diablo reservoirs, Mr. Walsh recommended that I contact agency leads for more detailed information.

The application reviewer asked the following question regarding Fish Passage and Protection:

1) No mandatory fish passage prescriptions were issued by NMFS or USFWS. According to Seattle City Light, this is due to the presence of natural barriers historically. The applicant also states however, that steelhead historically passed Gorge Dam. Why, in your opinion, was fish passage not prescribed by NMFS/USFWS?

Mr. Walsh responded that fish passage, and specifically steelhead passage, at the dams is not an issue for the tribes. Mr. Walsh explained that, as far as the tribes were concerned, very little spawning habitat exists for steelhead upstream of the dams. Furthermore, Mr. Walsh explained that that parties to the settlement agreement agreed to focus on improving fish habitat conditions in river reaches upstream and downstream of the project, instead of using resources to provide fish passage.

The application reviewer asked the following question regarding TES species:

1) The Application indicated that ongoing monitoring has shown evidence that project operations do not negatively affect chinook salmon and other salmon species. Can you confirm?

Mr. Walsh stated that populations of most salmonid species in the Skagit River system have significantly improved over the years since the settlement agreement, while populations of salmonids in other Washington State rivers have declined.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	March 20, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Bob Wright/Washington Department of Ecology
Telephone Number:	(425) 649-7060
Area of Expertise:	Water Quality

Substance of Discussion:

The application reviewer asked the following questions regarding Water Quality:

1) To your knowledge, are there any water quality issues regarding the project?
2) The settlement agreement materials refer to a water quality certification issued in 1977 for the project; however the application indicates that the State waived certification for the project. Is there a water quality certification for the project?
3) A statutory "special condition status" exists for the Gorge Dam bypass reach (WAC 173-201A). Why is this special status needed? What is the history on this?

Mr. Wright does not believe water quality is a significant issue on the upper Skagit River. He stated that no water quality certification exists for the project and that the Department of Ecology did indeed waive their right to certification for the bypass reach. Mr. Wright stated that there is no requirement for ongoing monitoring near the project, although Seattle City Light occasionally performs monitoring voluntarily. Regarding the special conditions status for the bypass reach, Mr. Wright explained that the status was a compromise for downstream mitigation and restoration of flow that allows Seattle City Light to generate power and provide flows for fisheries.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	March 24, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Gary Sprague/ Washington State Department of Fish and Wildlife
Telephone Number:	(360) 902-2539
Areas of Expertise:	Flows, Fish Passage and Protection

Substance of Discussion:

The application reviewer asked the following questions regarding Flows:

1) Has Seattle City Light met the conditions of the flow and non-flow settlement agreements in your opinion?
2) Do you feel the "full and complete" and "best efforts clause" is being implemented by the applicant to the extent feasible?
3) How significant were fry strandings before the flow agreements in the early 1980's?
4) Flow requirements were specified only for Gorge Dam below the powerhouse in the settlement agreements; are there any flow/fisheries related issues regarding Gorge and Diablo reservoirs or the bypass reach?

Mr. Sprague stated that in his opinion, the settlement agreement is well-designed, and that overall, Seattle City Light has been meeting all the requirements of the settlement agreement. He acknowledged that there have been occasional "variances" in flows and some fry strandings due to potholes which are difficult to avoid. However, he explained, the applicant has been fulfilling the "full and complete" and "best efforts clause". He provided one example where Seattle City Light spilled water from the Gorge Dam spillway during the year 2000 transition instead of providing flows from the powerhouse as an extra measure of protection for fisheries in case there were issues with powerhouse computers. Mr. Sprague stated that ramping rates may be improved with new information in the future, and that Seattle City Light was open to adaptively managing releases in response to new information. Regarding fry strandings, Mr. Sprague believed that they were a significant issue, and that while they still occasionally occur now, conditions are much improved. Mr. Sprague did not know of specific flow or fisheries issues regarding Gorge and Diablo reservoirs. His understanding of the bypass reach issue was that during negotiations, the reach was given up to provide flows and habitat protection downstream.

Mr. Sprague stated that, overall, Seattle City Light has a strong fish protection policy (the "fish first" policy), and that there were significant improvements in the number of spawning salmonids on the Skagit River system, while other rivers have shown a downward trend. He explained that Seattle City Light has supported numerous aquatic habitat improvement projects including the creation of side channel habitat and habitat connectivity projects.

The application reviewer asked the following question regarding Fish Passage and Protection:

1) No mandatory fish passage prescriptions were issued by NMFS or USFWS. According to Seattle City Light, this is due to the presence of natural barriers historically. The applicant also states however, that steelhead historically passed Gorge Dam. Why, in your opinion, was fish passage not prescribed by NMFS/USFWS?

Regarding historical passage through the Gorge reach, Mr. Sprague thought that a narrow range of flow conditions would have been necessary for passage, and that these flows occasionally occurred during steelhead spawning periods historically; however, few fish likely spawned above the area of the dams, and so fish passage was given up to provide more resources for flow and habitat improvement.

Mr. Sprague provided some additional information regarding bull trout and water quality issues. He mentioned that woody debris blocks in Ross Lake resulting from draw down of the reservoir was one of the most significant issues identified by his department, and that the issue was being dealt with by crews from Seattle City Light who have been removing any debris that blocks upstream tributary passage for bull trout. Mr. Sprague also discussed the significance of glacial till in affecting water quality in Gorge and Diablo lakes, stating that the majority of the till sediment is from glaciers at the headwaters of Thunder Creek.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	March 26, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Brian Cladoosby, Chair/Swinomish Indian Tribal Community
Telephone Number:	(360) 466-7205
Areas of Expertise:	Cultural Resources

Substance of Discussion:

Mr. Cladoosby recommended that I speak to Larry Campbell (see ROC below) regarding cultural properties near the Skagit Project.

Date of Conversation:	March 31, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Larry Campbell/Swinomish Indian Tribal Community
Telephone Number:	(360) 466-1236
Areas of Expertise:	Cultural Resources

Substance of Discussion:

The application reviewer asked the following questions regarding Cultural Resources:

1) In your opinion, is Seattle City Light meeting its obligations under the settlement agreement and other subsequent agreements?

Mr. Campbell stated that Seattle City Light has been flexible and vigilant in meeting its obligations under the settlement agreement, and has a strong interest in maintaining a good relationship with the tribes. The applicant has been easy to work with on various projects, including the funding of a smokehouse and identification of additional cultural properties within the area of the Skagit Project.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	March 31, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Jason Joseph, Chair/Sauk-Suiattle Tribe
Telephone Number:	(360) 436-0131
Areas of Expertise:	Cultural Resources

Substance of Discussion:

Mr. Jason Joseph recommended that I speak to James Joseph (see ROC below) regarding cultural properties near the Skagit Project.

Date of Conversation:	March 31, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	James Joseph/Sauk-Suiattle Tribe
Telephone Number:	(360) 436-1124
Areas of Expertise:	Cultural Resources

Substance of Discussion:

The application reviewer asked the following questions regarding Cultural Resources:

1) In your opinion, is Seattle City Light meeting its obligations under the settlement agreement and other subsequent agreements?

Mr. James Joseph stated that Seattle City Light has handled cultural issues well, and is concerned about maintaining a good relationship with the tribes. He mentioned that cultural issues representatives from Seattle City Light occasionally meet with tribal representatives to discuss ongoing projects and to check in regarding any up-and-coming issues. According to Mr. Joseph, the applicant has made a concerted effort to connect various issues, including tribal fisheries and cultural issues to provide longer-term solutions.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	April 2, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Bob Mierendorf/National Park Service
Telephone Number:	(360) 873-4590
Areas of Expertise:	Cultural Resources

Substance of Discussion:

The application reviewer asked the following questions regarding Cultural Resources:

1) In your opinion, is Seattle City Light meeting its obligations under the settlement agreement and other subsequent agreements?

Mr. Mierendorf is an archeologist for the National Park Service and has worked closely with all tribal organizations and several local utilities in the Skagit area. He supervised and performed most of the archeological work associated with the settlement negotiations. Mr. Mierendorf stated that Seattle City Light has done a very good job of working with the tribes and the National Park Service on cultural and historical preservation issues. He believes Seattle City Light has a very good relationship with the tribes and is one of the most proactive utilities he has worked with.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	April 2, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Fayette Krause/North Cascades Conservation Council & TNC
Telephone Number:	(206) 343-4345 ext. 337
Areas of Expertise:	Watershed Protection

Substance of Discussion:

The application reviewer asked the following questions regarding Watershed Protection:

1) Has Seattle City Light met the conditions of the Wildlife Settlement Agreement (which contains the bulk of watershed protection provisions) in your opinion?

Mr. Krause is an employee of The Nature Conservancy (TNC) who worked with the North Cascades Conservation Council ("N3C") during the FERC settlement negotiations, and has continued to be involved in implementation of the Wildlife Settlement Agreement which contains many of the provisions for watershed protection. Mr. Krause stated that the overall working relationship with Seattle City Light has been positive, and that the utility has consistently gone beyond the settlement agreement to implement watershed protection measures. According Mr. Krause the applicant has done a good job at focusing on specific areas for land acquisition, instead of purchasing scattered parcels in the watershed. Mr. Krause stated that the primary vehicle for watershed protection under the settlement agreement is land acquisition, and that the utility has a strong land protection policy that does not promote resource extraction of any kind.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	April 4, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Gretchen Luxenberg/National Park Service
Telephone Number:	(206) 220-4138
Areas of Expertise:	Cultural Resources

Substance of Discussion:

The application reviewer asked the following questions regarding Cultural Resources:

1) In your opinion, is Seattle City Light meeting its obligations under the settlement agreement and other subsequent agreements?

In Ms. Luxenberg's initial message, she mentioned that her statements regarding the Skagit Hydroelectric Project would represent the viewpoints of both Stephanie Toothman, her supervisor, and herself at the request of Ms. Toothman.

Ms. Luxenberg stated that, overall, Seattle City Light has done a good job protecting cultural resources and has taken a collaborative approach to cultural resource issues. She further stated that the level of commitment the applicant has to cultural resources is remarkable considering their primary function as a municipal utility, and in comparison to other utilities, Seattle City Light has provided a high level of support. According to Ms. Luxenberg, Seattle City Light has a large number of cultural resources for which they are responsible, however, the applicant's recent financial problems have caused some concern regarding their ability to continue to maintain and support historic and cultural resources. In addition, Ms. Luxenberg stated the loss of Seattle City Light's long time superintendent, Gary Zarker, has caused some concern about the direction the utility will take with regard to cultural resources. The recent financial issues have resulted in funding and staffing cuts that have affected the maintenance of historic landscaping areas and structures according to Ms. Luxenberg. Ms. Luxenberg would like to see Seattle City Light become more open to outside preservation groups providing assistance in maintaining the many historic sites under the applicant's care. She also mentioned that recent staff turnover has made it difficult to provide adequate historical maintenance training. Ms. Luxenberg was particularly concerned with the status of the Gorge Inn, which is a key landmark near the Gorge Dam and is, according to Ms. Luxenberg, in a state of disrepair.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	April 7, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Gary Engman/Washington State Department of Fish and Wildlife
Telephone Number:	(425) 775-1311 ext. 122
Areas of Expertise:	Watershed Protection, TES

Substance of Discussion:

The application reviewer asked the following questions regarding Watershed Protection:

1) Has Seattle City Light met the conditions of the Wildlife Settlement Agreement (which contains the bulk of watershed protection provisions) in your opinion?

Mr. Engman stated that overall, his agency is satisfied with the applicant's implementation of the Wildlife Settlement Agreement. However, Mr. Engman mentioned that some disagreement exists about the management of elk habitat on Seattle City Light land in the South Fork Noonsack River Basin (Section 3.2.2 – Wildlife Settlement Agreement). According to Mr. Engman, elk have suffered serious population declines in the area. His agency would like to accomplish the goal of reviving local populations through habitat management of those areas, but the implementation of habitat manipulation remains an unresolved issue. Mr. Engman acknowledged that has agency has postponed some projects and programs at the applicant's request due to financial problems at Seattle City Light.

The application reviewer asked the following question regarding TES species:

1) The Application indicated that ongoing monitoring has shown evidence that project operations do not negatively affect chinook salmon and other salmon species. Can you confirm?
2) Can you also confirm their assertion that bull trout are not negatively affected by the project?
3) Are there any outstanding TES or Wildlife issues with the Skagit Project that you know of?

Mr. Engman stated that most salmonid species are showing a marked improvement in population numbers, however steelhead do not seem to be following the trend of other salmonids in the Skagit system due to unknown factors. Chinook populations seem to be holding or increasing in the Skagit system, he said. There are no outstanding bull trout issues according to Mr. Engman; all of the initial concerns about bull trout have been addressed by Seattle City Light. There were no outstanding wildlife issues (i.e. bald eagle collisions) as far as he knew.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	April 7, 2003; April 24, 2003 (Additional Information)
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Steve Fransen/National Marine Fisheries Service
Telephone Number:	(360) 753-6038
Areas of Expertise:	Flows, Fish Passage and Protection, TES Species

Substance of Discussion:

The application reviewer asked the following questions regarding Flows:

1) Has Seattle City Light met the conditions of the flow and non-flow settlement agreements in your opinion?
2) Do you feel the "full and complete" and "best efforts clause" is being implemented by the applicant to the extent feasible?
3) How significant were fry strandings before the flow agreements in the early 1980's?
4) Flow requirements were specified only for Gorge Dam below the powerhouse in the settlement agreements; are there any flow/fisheries related issues regarding Gorge and Diablo reservoirs or the bypass reach?

Mr. Fransen stated that the applicant has met and exceeded the conditions of the FERC license. Including a "full and complete" and "best efforts clause" in the agreement was a significant message by Seattle City Light that they were committed to fish protection. He said that fry strandings and other flow-related issues were significant problems before the flow agreements. Mr. Fransen did not know of any flow or fisheries-related issues with the project reservoirs.

The application reviewer asked the following question regarding Fish Passage and Protection:

1) No mandatory fish passage prescriptions were issued by NMFS or USFWS. According to Seattle City Light, this is due to the presence of natural barriers historically. The applicant also states however, that steelhead historically passed Gorge Dam. Why, in your opinion, was fish passage not prescribed by NMFS/USFWS?

Mr. Fransen stated that the decision not to call for fish passage was driven by a combination of biological and policy considerations. Mr. Fransen explained that, according to the best estimate (based on limited information), chinook and steelhead may have passed through the area of the Gorge Dam historically, but would not have been able (under most flows) to pass through the Diablo Dam area, due to natural barriers. In addition, Mr. Fransen explained, very little habitat would have been made available if fish passage was installed, since much of the mainstem spawning locations in the project area are inundated by the project reservoirs, and little usable habitat exists in nearby tributaries, such as Stetattle Creek. Fish passage would have been very expensive to install, and in the worse case scenario, may have resulted in no improvement to the fisheries of the river, Mr. Fransen explained. In contrast, solid information existed regarding the benefits of modified flows downstream of the project to fisheries, so more resources (money and water) were committed to providing instream flows.

The application reviewer asked the following question regarding TES species:

1) Will there be any new regulations resulting from the recovery planning process for bull trout and chinook? Will NMFS/USFWS request a "re-opened" license for Section 7 consultation?
2) SCL indicated in their application that ongoing monitoring has shown evidence that project operations do not negatively affect chinook salmon and other salmon species. Can you confirm?
3) Can you also confirm their assertion that bull trout are not negatively affected by the project? Bull trout (presumably adfluvial forms) are present in Diablo and Gorge reservoirs; are their any concerns about these populations? How significant is the lack of tributary access in the Ross Lake area? Are there issues with drawdown in drought years on bull trout tributary access in Diablo and Gorge reservoirs?
4) Are there any outstanding TES or Wildlife issues with the Skagit Project that you know of?

Mr. Fransen stated that Section 7 consultation for chinook issues may occur between NMFS and Seattle City Light in the future as a result of the recovery planning process, however his agency viewed the Skagit Project as being one of the lowest priorities in terms of operational changes. NMFS has requested that Seattle City Light defer Section 7 consultation until the backlog of consultations is taken care of. Mr. Fransen stated that chinook populations in the Skagit River have increased or have been held constant, while nearby populations have declined by up to fifty percent. For unknown reasons, steelhead have not done as well as hoped with the new flow regime. However, he believes that salmonids in the Skagit River are doing as well with the project as they would without the project at this point. Monitoring of the various salmonid life stages and the effect of flows is ongoing and the applicant has been flexible in making changes to flow conditions based on changing spawning patterns, according to Mr. Fransen. Regarding bull trout, Mr. Fransen did not think there were any ongoing issues, but deferred to USFWS and state Fish and Game biologists. Mr. Fransen did not know of any other outstanding TES issues.

Additional Information

In a followup conversation with Mr. Fransen on April 24, 2003, I sought to clarify some points that had been disputed by Seattle City Light staff regarding fish passage and the inundation of historical spawning areas. Mr. Fransen confirmed that inundation of historical habitat was indeed part of the reason why resource agencies did not require fish passage at Gorge Dam. Mr. Fransen stated that he was deeply involved in the settlement agreement process for several years and clearly recalled the issues. He stated that 2 of the 3 historical spawning sites between Gorge and Diablo dams were now inundated. The two sites were Cedar and Reflector bars. The third area consisted of the lower 1.5 miles of Stetattle Creek. Another reason was that there was not a significant amount of habitat remaining. Regarding fish passage, Mr. Fransen stated that the resource agencies were convinced that it was "more likely than not" that some steelhead, and possibly chinook salmon, passed upstream of the Gorge Dam area historically.

Report of Contact/Personal Communication

Skagit River Hydroelectric Project

Date of Conversation:	April 3, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Bill Paleck/National Park Service
Telephone Number:	(360) 856-5700 ext. 651
Areas of Expertise:	Recreation

Substance of Discussion:

The application reviewer asked the following questions:

1) Is Seattle City Light in compliance with recreational aspects of the settlement agreements?
2) Are there any outstanding recreational issues with the Skagit Project?

Mr. Paleck stated that there are no outstanding issues regarding the project and recreation requirements. The applicant has been flexible with implementation of the settlement agreement terms, and is a model for the FERC process, according to Mr. Paleck. The Park Service has formed a strong relationship with Seattle City Light, and has agreed to delay some recreation-related projects to help with Seattle City Light's current financial issues.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	April 15, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Jeff Chan/U.S. Fish and Wildlife Service
Telephone Number:	(360) 753-9542
Areas of Expertise:	TES species

Substance of Discussion:

The application reviewer asked the following question regarding TES species:

1) Will there be any new regulations resulting from the recovery planning process for bull trout? Will USFWS request a "re-opened" license for Section 7 consultation?
2) Can you also confirm their assertion that bull trout are not negatively affected by the project? Bull trout (presumably adfluvial forms) are present in Diablo and Gorge reservoirs; are their any concerns about these populations? How significant is the lack of tributary access in the Ross Lake area? Are there issues with drawdown in drought years on bull trout tributary access in Diablo and Gorge reservoirs?
3) Are there any outstanding TES or Wildlife issues with the Skagit Project that you know of?

Mr. Chan stated that the U.S. Fish and Wildlife Service (USFWS) is currently evaluating the need for passage in the Skagit Project for bull trout as part of the agency's recovery planning process, but that passage may not necessarily be required. According to Mr. Chan, the agency is not currently considering passage options that would link the upper and lower Skagit River reaches, but is studying the possibility of providing passage linking the Gorge and Diablo reservoirs to the Ross Lake system. Mr. Chan mentioned that a Seattle City Light biologist is a member of the recovery planning team for bull trout and will be involved in implementing any mitigation measures resulting from the recovery plan. Populations of bull trout are healthy in the project area according to Mr. Chan, particularly in Ross Lake. Mr. Chan did not know of an specific issues with the Ross Lake regarding bull trout tributary access, and did not know of any outstanding TES or wildlife issues.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	April 15, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Bob Kuntz/National Park Service
Telephone Number:	(360) 856-5700 ext. 368
Areas of Expertise:	Watershed, TES species

Substance of Discussion:

The application reviewer asked the following question regarding TES species:

1) Are there any outstanding TES or Wildlife issues with the Skagit Project that you know of?

Mr. Kuntz knew of no outstanding TES/Wildlife issues regarding the Skagit Project. SCL implemented bald eagle strike mitigations according to plan.

The application reviewer asked the following questions regarding Watershed Protection:

1) Has Seattle City Light met the conditions of the Wildlife Settlement Agreement (which contains the bulk of watershed protection provisions) in your opinion?

According to Mr. Kuntz, the implementation of the agreement is going well. The land acquisition program is currently shifting into a land management phase. He stated that he didn't know of any issues regarding SCL's financial situation affecting the implementation of the settlement agreements.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	April 23, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Ed Connor/Fisheries Biologist, Seattle City Light
Telephone Number:	(206) 615-1128
Areas of Expertise:	Flows, Fish Passage and Protection, TES Species

Substance of Discussion:

Note: this ROC contains a summary of information conveyed in phone conversations. Clarifications and corrections to this ROC are included as excerpts from a May 8, 2003 memo from Mr. Connor. The bulk of the discussions involve the potential for steelhead passage at one of two barriers located in the Gorge bypass reach, as identified in a 1989 barrier analysis (Envirosphere 1989).

Mr. Connor stated that steelhead migration and spawning corresponds to the general timing of high flows in the Upper Skagit and that this timing may have allowed steelhead to pass a major barrier in the Gorge bypass reach under certain flow conditions, possibly at 1000 cfs. A plunge pool may form below the barrier at 1000 cfs or higher, which would allow steelhead to jump the barrier, according to Mr. Connor. Mr. Connor continued, saying that the entire area is white water at higher flows, which may limit steelhead movement.

In the May 8, 2003 memo, Mr. Connor states:

"During this conversation, I stated that the plunge pool located below the first barrier in the Gorge Reach increases in depth with increasing discharge. This is correct, and is consistent with what is written in the Ebasco (1989) habitat report on the Gorge Reach. It should be emphasized that this plunge pool is shallow, and is less than 2 ft deep under baseflow conditions. The contact report is also correct in stating that spawning timing of steelhead (i.e., spring) coincides with a period having higher natural flows in the Skagit River (due to snowmelt). However, I recall emphasizing that upstream passage becomes more difficult at flows greater than 1,000 cfs, not less difficult. I also recall stating that upstream passage would most likely occur within a narrow range of flows, and that the upper range of these flows was probably less than 1,000 cfs. My conclusion is based on observations of hydraulic conditions in the Gorge Reach under spill conditions, on the leaping and swimming characteristics of steelhead trout, and on the analysis of fish barriers I have completed in recent years using passage criteria developed by Powers and Osborn (1985)."

"Upstream passage becomes more difficult as flows increase because the plunge pool below the first barrier in this Gorge Reach become solid white water, as observed at flows of 1,000 cfs. Leaping and swimming ability is greatly diminished in "white" (frothy) water due to large amounts of air entrained as bubbles. The leaping and swimming criteria cited in the Stillwater report are for "black water" conditions (i.e., no air entrainment)(Powers and Osborn 1985). Also, the plunge pool below the first barrier is shallow (about 4 ft deep at 1,000 cfs), and is too shallow given the height of the falls at the lower end of the first barrier (about 7 ft at 1,000 cfs). A plunge pool depth of approximately 9 ft would be required for a fish to successfully leap a 7 ft barrier based upon upstream passage criteria cited in Powers and Osborn (1985). I mentioned that the position of the hydraulic standing wave, the point where fish

leap when attempting clear a barrier (Stuart 1964), is a considerable distance downstream from the first barrier at higher flows. Even though the vertical distance a fish must leap decreases as the plunge pool becomes deeper at higher flows, the horizontal distance that must be cleared appears to exceed the leaping ability of steelhead. The maximum horizontal leaping distance for steelhead to clear a 7 ft barrier is 12 ft, based upon trajectory criteria established by Powers and Osborn (1985)."

"On page 11, Stillwater states that 'the author believed it was possible that steelhead might pass under certain flow conditions'. I would like to clarify that I was referring to a narrow range of flows that occur under 1,000 cfs. Flows less than 1,000 cfs would have occurred infrequently in the Gorge Reach under natural conditions. Under pre-project conditions, the average flow in the Gorge Reach during the steelhead spawning period (March – May) was 5,500 cfs. Flows of 1,000 cfs and less would have occurred less than 5% of the time during the steelhead spawning period."

"Stillwater also states on Page 11 that calculated water velocities in the area of the barrier would "not prevent passage upstream". I would like to emphasize that the velocity measurements cited in Ebasco (1989) report were obtained from transects intended to describe general habitat conditions in the Gorge Reach at different flows (i.e., width, depth, and average velocities), and were not intended to quantify velocities within the narrow bedrock and boulder chutes which are present in the Gorge Reach. Based upon visual observations, velocities in the narrow chutes located immediately above Barriers 1 and 2 appear to be high (> 15 ft per second). Detailed survey measurements of these areas, and an analysis of these measurements based using special hydraulic calculations, would be required to predict velocities in these areas at different flows."

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Email:	April 26, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	Gene Stagner/US Fish and Wildlife ServiceTelephone
Number:	(360) 753-4126
Areas of Expertise:	Flows, Fish Passage and Protection, TES Species

The following ROC contains the relevant excerpts of an email received by Bill Sears from Gene Stagner, USFWS on April 26, 2003.

- Question: Has Seattle City Light met the conditions of the Wildlife Settlement Agreement in your opinion?
- Answer: As Far as I know they have. I have only had two meetings with SCL about wildlife and judging by the rest of the resource agencies on the committee, things were going well.

- Question: Will there be any new regulations resulting from the recovery planning process for bull trout?
- Answer: I doubt it. Recovery planning is just that, a plan for recovery. It makes recommendations but other than FWS projects can't force any actions.

- Question: Might the USFWS request a "re-opened" license for Section 7 consultation?
- Answer: Unknown at this time. Way too many other fires to put out to even address this.

- Question: Are there any outstanding issues regarding bull trout and the project? Bull trout (presumably adfluvial forms) are present in Diablo and Gorge reservoirs; are their any concerns about these populations?
- Answer: Mark Downen at WDFW would be a much better contact for this and following questions.

- Question: How significant is the lack of tributary access in the Ross Lake area? Are there issues with drawdown in drought years on bull trout tributary access in Diablo and Gorge reservoirs?
- Answer: From my limited knowledge the barriers to migration only effect the trout that spawn in the spring. During bull trout staging and migration the reservoirs are full with little fluctuations and would provide no significant delay for bull trout. Mostly there is very little known about bull trout related to the Skagit projects. SCL has been amenable to doing bull trout surveys and are at least partially funding a study by Mark Downen (I think).

- Question: Are there any outstanding TES species issues surrounding the project?
- Answer: Other than bull trout, I'm not aware of any. You also need to understand that my involvement in the Skagit project has been very minimal and I have higher priority projects such as active relicensing to focus on. From my limited work with SCL and the Skagit Project, I have a favorable opinion about how the new license is being implemented. Hope this helps.

Report of Contact/Personal Communication
Skagit River Hydroelectric Project

Date of Conversation:	May 11, 2003
Application Reviewer:	Bill Sears/Stillwater Sciences
Person Contacted:	William Trush/Professor – California State University, Humboldt
Number:	(707) 826-7794 ext. 12
Areas of Expertise:	Salmonid Fisheries

I contacted Bill Trush to obtain additional information regarding the leaping ability of steelhead, as cited in Roelofs (1987) and included in this final report. Mr. Trush explained that the 17 ft value was based on the observations of resource agency personnel at a site in Idaho. The conditions at the site were considered ideal for such a leap and included a deep pool more than 1.5 times the height of the falls and a strong up-current, which provided additional velocity for the fish.